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MODELS USB-104-HUB & USB-3.5-HUB

INDUSTRIAL FOUR PORT USB 2.0 HUB

USER MANUAL

FILE: MUSB-104-HUB.C1h

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WARNING!!

ALWAYS CONNECT AND DISCONNECT YOUR FIELD CABLING WITH THE COMPUTER POWER OFF. ALWAYS TURN COMPUTER POWER OFF BEFORE INSTALLING A CARD. CONNECTING AND DISCONNECTING CABLES, OR INSTALLING CARDS INTO A SYSTEM WITH THE COMPUTER OR FIELD POWER ON MAY CAUSE DAMAGE TO THE I/O CARD AND WILL VOID ALL WARRANTIES, IMPLIED OR EXPRESSED.

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Prior to shipment, ACCES equipment is thoroughly inspected and tested to applicable specifications. However, should equipment failure occur, ACCES assures its customers that prompt service and support will be available. All equipment originally manufactured by ACCES which is found to be defective will be repaired or replaced subject to the following considerations.

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If a unit is suspected of failure, contact ACCES' Customer Service department. Be prepared to give the unit model number, serial number, and a description of the failure symptom(s). We may suggest some simple tests to confirm the failure. We will assign a Return Material Authorization (RMA) number which must appear on the outer label of the return package. All units/components should be properly packed for handling and returned with freight prepaid to the ACCES designated Service Center, and will be returned to the customer's/user's site freight prepaid and invoiced.

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First Three Years: Returned unit/part will be repaired and/or replaced at ACCES option with no charge for labor or parts not excluded by warranty. Warranty commences with equipment shipment.

Following Years: Throughout your equipment's lifetime, ACCES stands ready to provide on-site or in-plant service at reasonable rates similar to those of other manufacturers in the industry.

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Under this Warranty, liability of ACCES is limited to replacing, repairing or issuing credit (at ACCES discretion) for any products which are proved to be defective during the warranty period. In no case is ACCES liable for consequential or special damage arriving from use or misuse of our product. The customer is responsible for all charges caused by modifications or additions to ACCES equipment not approved in writing by ACCES or, if in ACCES opinion the equipment has been subjected to abnormal use. "Abnormal use" for purposes of this warranty is defined as any use to which the equipment is exposed other than that use specified or intended as evidenced by purchase or sales representation. Other than the above, no other warranty, expressed or implied, shall apply to any and all such equipment furnished or sold by ACCES.

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Chapter 1: Introduction

The USB-104-HUB is a high performance and low cost solution for rugged, reliable, Made-in-the-USA USB expansion. It is compliant with the USB 2.0 specification as well as being fully backwards compatible with USB 1.1. Each of the four downstream ports are capable of Low-speed, Full-speed, and Hi-speed transfers.

Features

- High-speed USB 2.0 device, USB 3.0 and 1.1 compatible
- Rugged, industrial grade (-40 ºC to 85 ºC) operation
- One upstream host port and four downstream ports
- Transaction translator translates data from one speed to another
- Downstream ports capable of low-speed (1.5 Mbps), full-speed (12 Mbps), and Hi-speed (480 Mbps) transfers aggregate
- Supports bus powered and self powered modes
- Self powered mode accessible via DC power input jack, and for OEM applications (board only), screw terminals, or 3.5" drive power connector (Berg)
- LED status indicators for power and overcurrent fault conditions for each downstream port
- Compact, low profile enclosure
- Can be installed in your desktop 3 ½" front panel drive bay
- High retention USB connectors on up- and downstream ports
- Embedded miniature USB headers in parallel with each USB standard connector (both upstream and downstream)

Applications

- Portable / Laptop
- Education / Laboratory
- Industrial Automation
- Embedded OEM
- Military Systems Expansion

Functional Description

This product utilizes a high-performance, low-power USB 2.0 hub controller. It is USB-IF certified, Windows Hardware Quality Lab (WHQL) compliant, and its operating temperature is rated for industrial grade environments. Being able to operate at industrial grade temperatures, the USB-104-HUB offers its functionality to a wider range of user applications that many competitors' USB hubs can't provide.

The card has light emitting diodes (LED) that indicate its status. A green LED near the upstream port's high-retention type B connector (visible through a cutout in the enclosure) indicates power to the board. Each downstream port has two respective surface mount diode (SMD) LEDs that provide status. A green LED near the downstream port's high-retention Type A receptacle (visible through a cutout in the enclosure) indicates that the port is enabled whereas the red LED indicates an overcurrent fault condition. The customer also has the option to specify jumper posts or a header connector to connect their own LEDs for panel mounting instead of the on-board SMD's if desired.

The USB-104-HUB is fully protected from faulty peripherals connected to its downstream ports. Each port utilizes its own power distribution switch that provides overcurrent and short-circuit protection. If a fault occurs, the power distribution switch will disengage the respective port and enable its fault LED as a latched visual indicator to the user. A fault occurring on one downstream port will not affect other devices attached to the USB-104-HUB other downstream ports. Any detected fault that occurs will result in a Windows message popping up on the monitor notifying the operator. To re-enable a faulted port, the user must clear the fault then cycle power to the hub.

The USB-104-HUB supports bus powered and self-powered applications. In general, the upstream USB port is typically supposed to provide 500 mA of current (5-unit load). In a bus-powered mode, this is the limiting factor as the downstream ports take their power from the upstream port's remaining available power. If the user's application requires more current for its downstream peripherals, the USB-104-HUB can be configured in self-powered mode. External +5V can be supplied to the card through three different methods. It is brought in via a DC power jack, or for OEM applications, via 2-position screw terminals, or a traditional 4-pin berg connector receptacle.

All Type A and the Type B USB connectors on the board feature a high retention design that complies with the class 1, Div II minimum withdrawal requirement of over 3 pounds of force (15 Newtons). This connector has an orange color-coded insulator to quickly differentiate it from standard USB connectors. Using these USB connectors increases reliability and ensures a tight connection. For embedded OEM type applications, all ports (upstream and downstream) have an alternative miniature USB header in parallel with the standard port connector. This method facilitates the smallest possible footprint to be occupied by the hub and associated cables.

The board is designed to be used in rugged industrial environments but is small enough to fit nicely onto any desk or testing station. The module is PC/104 sized (3.550 by 3.775”), while the enclosure is 4” x 4” x 1”.

Ordering Guide

● USB-104-HUB	USB 2.0 Hi-Speed Industrial HUB
● USB-3.5-HUB	4-port hub with bracket for installation into 3.5” drive bay

Model Options

● -P	Includes regulated 5VDC @ 2.5A external power adaptor
● -WI	Wide Input power range from 7V to 35VDC
● -OEM	Board only version (no enclosure)
● -HDR	Jumper header posts for LEDs instead of SMD LEDs (-OEM version only)

Included with your USB-104-HUB

The following components are included in your shipment. Please take the time now to ensure that no items are damaged or missing.

- USB Module in labeled enclosure with an anti-skid bottom
- 6' USB 2.0 cable type A to B
- ACCES Software Master CD (installs this user manual and the option configuration setup program)

Included with your USB-3.5-HUB

- USB Module installed on a powder-coated drive-bay bracket
- Two M3-.5 php screws to secure the bracket into the drive bay
- ACCES Software Master CD

Not included with your USB-3.5-HUB, but required

- CUSB-HDR-AR (5-pin header to type A receptacle 8”) & CUSB-1 (14” AB cable)
- *or* CUSB-EMB-HDR / CUSB-EMB-HDRM

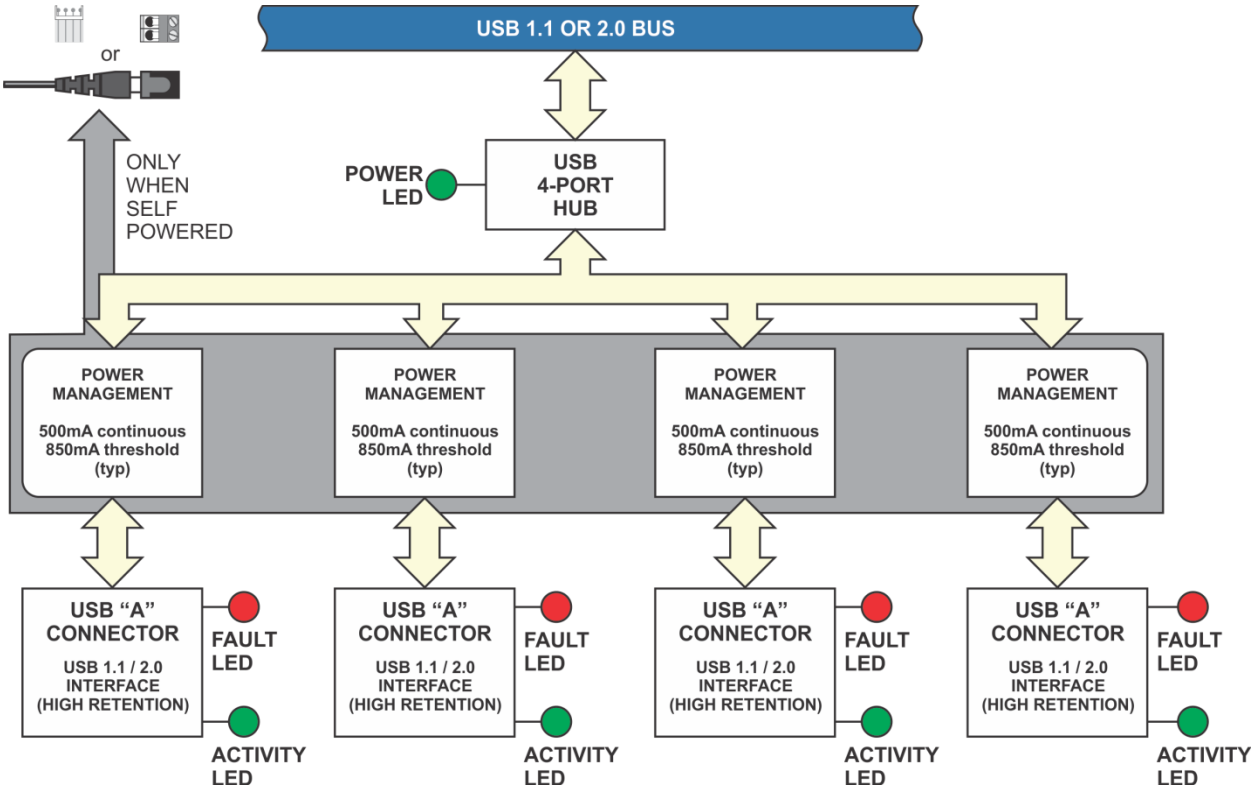

Figure 1-1: Block Diagram

Optional Accessories

• MP104-DIN	DIN-rail mounting provision
• CUSB-EMB-PWR	Power splitter cable for 3.5” drive bay mounting
• CUSB-EMB-1	1ft USB Type A to micro-fit OEM header
• CUSB-EMB-6	6ft USB Type A to micro-fit OEM header
• CUSB-EMB-HDR*	30" USB 1x5 standard header to micro-fit OEM cable
• CUSB-EMB-HDRM*	30" USB 1x5 metric header to micro-fit OEM cable
• CUSB-EMB	6" micro-fit to micro-fit embedded OEM cable
• CUSB-HDR-AR & CUSB-1	5-pin header to type A receptacle 8” & 14” AB cable

* = Standard or metric header cable is a required accessory for the USB-3.5-HUB

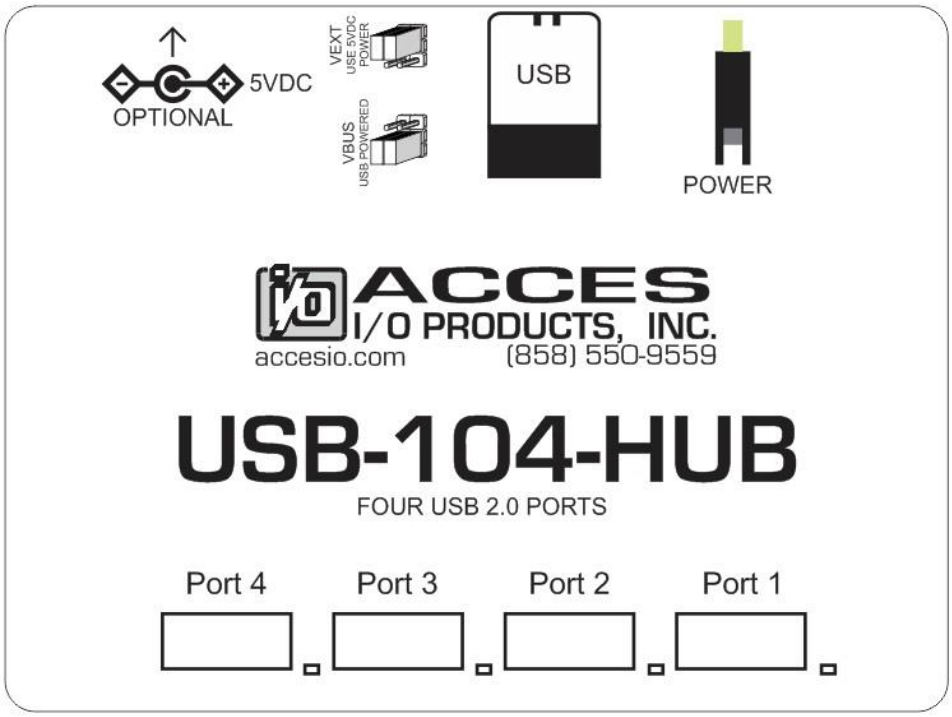

Figure 1-2: Enclosure Label

Chapter 2: Installation

Software CD Installation

No software is provided with this board. There is no need to install any drivers for the USB-104-HUB product. It will enumerate as a Generic Hub using the USB Hub Class Driver that is built into Windows OS or Linux. There's no driver needed from the user.

Hardware Installation

The unit can be connected to any USB 2.0 or USB 1.1 port.

USB-3.5-HUB Installation Instructions

1. Shut down the PC.
2. Remove the side cover of the PC to gain access to the power supply wiring harness and 3.5" drive bay.
3. Remove the plastic 3.5" drive bay cover by popping it out through the front panel.
   a. Or, remove the 3.5" floppy drive.
      i. Disconnect ribbon cable from back of floppy drive.
      ii. Disconnect berg (power) connector from back of drive.
      iii. Remove screws to release the drive.
      iv. Open the other side panel, remove any remaining drive screws.
      v. Slide the old drive through the PC front panel and recycle it.
4. Gain access to the floppy drive power connector (Berg) in the wiring harness from the power supply and pull some slack out of the harness.
   a. If this connector will still be used in your PC, we offer a power cable that plugs to the larger 4-position Molex as model CUSB-EMB-PWR.
5. Locate an open (unused) USB 2.0 header on your motherboard and connect the mating connector (observing proper orientation) of the CUSB-EMB-HDR or CUSB-EMB-x cable you specified and ordered with the hub.
6. Pull the power connector through the open bay and plug it onto P7 of the hub.
   a. It may be necessary to cut type-wraps to pull enough slack from the wiring harness so the connector can be fed through the open drive bay.
7. Verify the VEXT / VUSB jumpers are both in the "VEXT" position (see Figure 3-1: Option Selection Map).
8. Push the assembly into the drive bay carefully to ensure the power connector doesn't catch on any sharp edges until the face of the bracket is flush* with the front panel of the PC.
   a. * You may have to pull the drive bay screw out to allow the bracket to move into position, then when aligned, push the screw in, initially securing the bracketed hub into position.
9. Connect the "B" side of the USB cable to the connector on the hub.
10. Remove the other side panel of the PC and carefully thread a screw (provided) into the other side of the hub bracket and tighten.
11. Re-install the cover you removed in step 10.
12. Dress the wiring harness (power and USB inside the PC).
13. Re-install the cover you removed in step 2.
14. Power up the PC and test your hub.

Chapter 3: Hardware Details

Refer to the Block diagram and the Option Selection Map when reading this section of the manual.

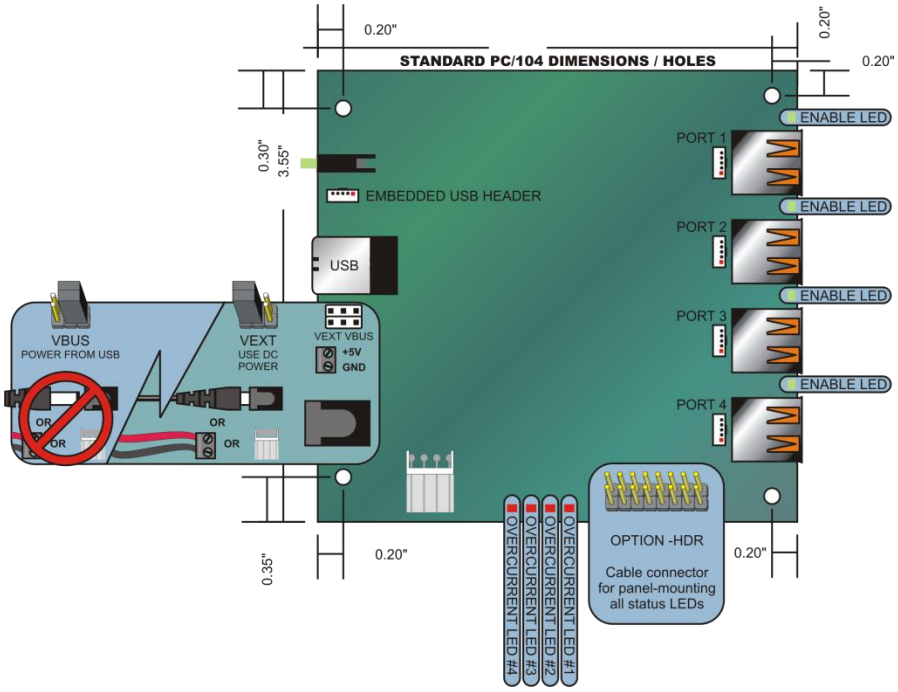

Figure 3-1: Option Selection Map

USB Connectors

The primary USB connector is a high-retention Type B and connects to the host USB port with the “A to B” cable provided. The host USB port provides communication signals along with +5 VDC power. Secondary USB connectors are high-retention Type A.

Embedded USB Connector (Upstream)

Mini 5-pin header (P2) in parallel with type B connector (P1). See Embedded USB Connector (Downstream) on next page for mating connector information.

LED

The LED on the front of the enclosure is used to indicate power to the board.

External Power Connections

When more current is needed from the upstream USB port (5 units of load = 500 mA), there are three options available. When using external power, switch the jumpers located near the USB connector to VEXT (self-powered), otherwise when the jumpers are in the VBUS position current is drawn from the USB port (bus-powered).

* See Note 1 and 2 in Chapter 4: Specifications regarding a hybrid jumper configuration when issues arise connecting this hub in self powered mode to a hub that is configured in bus powered mode.

- **DC Power Jack**
  DC1 is a DC jack that has a 2.00mm post on board and is designed to be used with a +5 VDC AC/DC external power supply that is optionally available, ordered as a factory option "-P". Part used is a KLDX-SMT2-0202-A.
- **Screw Terminals**
  TB1 is a two-position screw terminal that provides a method for the user to connect the external power +5V and return (GND). Note that power applied through TB1 must follow the USB specification of providing no more than +5.25V and no less than +4.75V (+5V±5%)
- **4-pin Berg Connector Receptacle**
  P7 can accept a traditional 4-pin Berg connector that typically is used to connect a floppy disk drive to the computer's power supply. The +5V and GND connections are used on-board. The +12V is a no connect on-board. The mating connector is p/n 171822-4 made by TE Connectivity.
- **WI Option**
  With the "Wide Input" power factory option, provide between 7VDC and 35VDC connected to the DC Power Jack or for –OEM versions, via the screw terminals.

Downstream LEDs and "-HDR" Factory option

Each downstream port has two status indicator LEDs. The green LED indicates power to the port and the red LED indicates an overcurrent fault condition. The user can specify the -HDR option when ordering which replaces the standard surface mount LEDs with a 16-pin right-angle header post. It has 0.100" spacing between pins.

PIN #	OVR4	EN4	OVR3	EN3	OVR2	EN2	OVR1	EN1	PIN #
	Port 4 over-current	Port 4 enabled	Port 3 over-current	Port 3 enabled	Port 2 over-current	Port 2 enabled	Port 1 over-current	Port 1 enabled	
1	Cathode	Cathode	Cathode	Cathode	Cathode	Cathode	Cathode	Cathode	1
2	Anode	Anode	Anode	Anode	Anode	Anode	Anode	Anode	2

Embedded USB Connector (Downstream)

There is a mini 5-pin header in parallel with the type A USB connector. The mating connector part number (at mouser.com) is **51021-0500,** while the crimp pins are **50079-8000.** Finally, a special crimper is needed, part number **63819-0300.** Of course, ACCES I/O offers a variety of USB cable solutions to mate with the mini USB headers on this board. Refer to the optional accessory table or contact the factory.

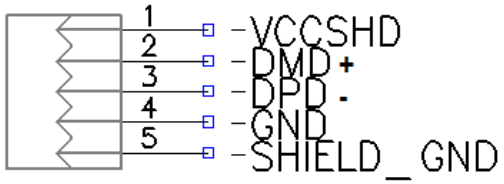

Figure 3-2: USB Mini Header Pinout

Chapter 4: Specifications

Data Rate

1.5 / 12 / 480 Mbps

Environmental

Operating Temp.:	-40° to +85°C
Storage Temp.:	-40° to +85°C
Humidity:	5% to 95% non-condensing
Board Dimension:	3.550 x 3.775 inches
Ext. Power Supply:	0° to 40°C

Power

+5VDC:	120 mA typical, high speed host, no active ports (doesn't include downstream ports' USB device requirements) 260 mA typical, high speed host, four active ports (doesn't include downstream ports' USB device requirements)
-WI Option:	7VDC to 35VDC at the DC power jack or screw terminals
Bus-powered*	approximately 100 mA available for each downstream port
Self-powered	approximately 500 mA available for each downstream port
Current-limiting	0.85 A typical each downstream port

*** Note 1:**

In a bus-powered application, current requirements must be closely monitored as the USB-104-HUB does not provide protection for the upstream port's power.

*** Note 2:**

In a bus-powered application, only 100 mA is available for each downstream port. If the downstream ports' peripherals requires more than 100 mA but is still less than the maximum current the upstream port can provide, the user can get around the power exceeded error by configuring the USB-104-HUB in self-powered mode while still drawing power from the upstream port. This can be accomplished by moving the TOP VEXT VBUS jumper to the VEXT position. The BOTTOM VEXT VBUS jumper must remain in the VBUS position. If performed, please comply to the power specifications to eliminate possible damage to the upstream port.

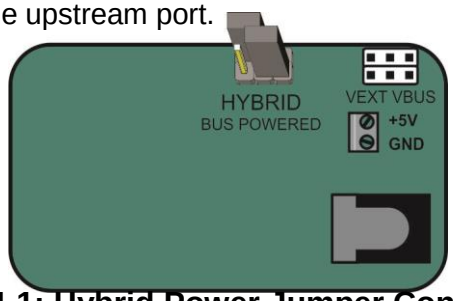

Figure 4-1: Hybrid Power Jumper Configuration

Customer Comments

If you experience any problems with this manual or just want to give us some feedback, please email us at: ***manuals@accesio.com***. Please detail any errors you find and include your mailing address so that we can send you any manual updates.

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